

# Motivating Manufacturing Energy Efficiency

A 2010 CARD [Energy Conservation Market Analysis](#) report authored by [Minnesota Technical Assistance Program \(MnTAP\)](#) identified potential gas and electric savings of about 2,509,532 MCF (8%) and 271,488,000 kWh (7%) respectively in Minnesota's industrial sector. MnTAP's ongoing work in this sector has determined that key requirements for addressing these opportunities include raising the awareness about the specific opportunities in individual facilities along with targeted assistance to help those facilities overcome barriers to implementation.

The goal of "Motivating Manufacturing Energy Efficiency," a CARD grant awarded to MnTAP in 2013, was to demonstrate and carry out a potential CIP program strategy to provide those services. Specifically, the strategy integrated energy assessments and lean manufacturing tools into MnTAP-sponsored intern projects designed to provide Minnesota manufacturers with energy efficiency recommendations and direct implementation assistance.

MnTAP identified and reached out to companies that were participating in some kind of lean manufacturing service and that had the potential to implement high energy efficiency solutions and production process improvements. MnTAP then paired each company with a highly qualified Minnesota engineering student intern who would work onsite with the company to identify and implement various lean methods to improve the energy efficiency within the company. The overall consensus on the internship program is that it was very successful because it offered:

- a cost-effective way to assist facilities in collecting information on energy-using equipment and processes;
- an interface with utility representatives to encourage project participation; and
- a vital follow-up with measurement and verification documentation.

*Figure 1: MnTAP Intern working at Kemps Ice Cream (Photo courtesy of MnTAP)*



Over the three-year cycle of the project, MnTAP interns worked directly with seven manufacturing facilities (Table 1) and identified energy conservation measures totaling 1,300,000 kWh of electricity

use and 4,800 therms of natural gas use. The total dollar value of these energy efficient improvements is approximately \$730,000.

**Table 1: Student Intern Academic Affiliation**

Year	Company	Student Affiliation
2013	Schwing America	Mechanical Engineering , UMD
	ST Specialty Foods	Industrial and Systems Engineering, UMTC
2014	Uponor	Mechanical Engineering, University of St. Thomas
	MGK	Industrial and Systems Engineering, UMTC
2015	Firmenich	Chemical Engineering, UMTC
	Kemps Ice Cream	Chemical Engineering, UMTC
	Lou-Rich	Mechanical Engineering, University of St. Thomas

As of May 2016, 13 of the recommendations, on a wide variety of technologies, have been at least partially implemented for an implementation rate of 52%, well above the typical 30% rate for energy efficiency recommendations in MnTAP's experience. These 13 projects amount to over half of the identified energy savings and about 45% of the dollar savings (Table 2). MnTAP believes that the implementation rate will increase, especially for the 2015 project cycle year because it takes time to fully execute the various improvements.

**Table 2: Proposed and Implemented Results by Suggestion Type**

Suggestion Type		Production gains	annual electricity reductions (kWh)	annual gas reductions (therms)	other annual reductions	annual savings
Compressed Air	proposed		459,900			\$41,800
	implemented		204,100			\$17,800
Equipment	proposed	280 hrs			112,000 lb liquid sugars 29,300 gallons H <sub>2</sub> O	\$34,900
	implemented					
Lean	proposed	1,850 hrs 53,000 lbs	29,000	2,612		\$176,000
	implemented	800 hrs	24,200	2,612		\$54,800
Lighting	proposed		11,000			\$1,300
	implemented		11,000			\$1,300

Process	proposed	14 hrs 75,000 lbs	586,800	2,200	27,600 lbs solvent 127,200 gallons H <sub>2</sub> O 47,200 lb solids 112,000 lb liquid sugars 7,200 lbs chemicals	\$455,800
	implemented	38,000 lbs	438,400		11,500 lbs solvent 14,000 gallons H <sub>2</sub> O	\$247,300
VFDs	proposed		177,400			\$16,000
	implemented		42,300			\$3,800

Typical utility programs are often short-term site assessments in order to motivate energy efficiency implementation. A MnTAP intern project integrates both the direct opportunity identification of the site assessments and the partnership building aspects of the energy teams, with the additional support of supplying short-term, cost-effective engineering resources that companies need to scope cost-effective solutions and launch implementation to capture the energy savings without having to divert company staff resources from their primary activities.

A MnTAP intern also helps with the documentation and support needed to verify the energy saving measures. This results in a more unified process which not only identifies more energy saving opportunities but implements and verifies more energy efficient projects, leading to reduced energy consumption and/or increased production. The project also demonstrated that applying lean tools to MnTAP intern projects uncovered additional energy efficiency opportunities beyond those identified in traditional assessments.

Based on MnTAP's analysis of the seven manufacturing facilities that participated in this project, MnTAP sees an opportunity for utilities to achieve more energy savings in Minnesota's industrial sector by engaging the facilities in new innovative methods, like the internship program. Furthermore, lean tools and energy intern assistance offers a valuable implementation opportunity for the state to meet energy efficiency and climate change goals.

Further details on the overall results of this study, as well as specifics regarding the industrial projects undertaken in this study, can be found in the final report, [Motivating Manufacturing Energy Efficiency: E2 Assessments & GreenLean<sup>SM</sup> Training with Directed Implementation](#). For more information on this CARD grant, contact project manager [Mary Sue Lobenstein](#).